

ONTARIO MINISTRY OF ENVIRONMENT
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BURLINGTON

Elizabeth Gardens

water pollution
control plant

1968

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Burlington Elizabeth Gardens :
water pollution control plant.
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Water management in Ontario

Ontario
Water Resources
Commission

135 St. Clair Ave. W.
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Ontario

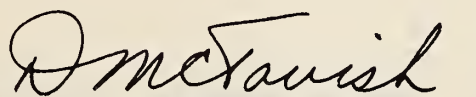
We are pleased to present you with the Operating Summary for the water pollution control facilities operated for you during 1968.

Both the financial and technical information presented should be of assistance to your present and future planning in this important phase of municipal activity.

A new format has been devised to allow greater readability with equally detailed content. We trust that this will meet with your approval.

Our staff wish to express their appreciation for your co-operation throughout the year.


D. S. Caverly,
General Manager.


D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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BURLINGTON

Elizabeth Gardens

water pollution control plant

operated for

THE TOWN OF BURLINGTON

by the

ONTARIO WATER RESOURCES COMMISSION

1968 ANNUAL OPERATING SUMMARY

FOREWORD

● This operating summary outlines the project's technical capabilities and financial status in 1968. Such information mirrors past and present performance, but a major intention is to anticipate the future -- to solve problems before they occur.

The new format in which this year's data are presented is designed to offer a higher level of readability than in the past, without a corresponding decrease in compactness, accuracy and detail.

Although your Regional Operations Engineer carries the major responsibility for the contents of the report, those involved in its preparation are attached to several Commission sections and divisions. The statistics section of the Division of Plant Operations compiled the information for the graphs and charts. The draughting section of the Division of Sanitary Engineering drew the graphs. The Division of Finance provided all cost data.

Only the close co-operation of these departments allowed the publication of this summary.

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'68 REVIEW

The Burlington Elizabeth Gardens Water Pollution Control Plant treated a total of 388.37 mg of sewage during 1968, at an operating cost of \$22,110.92. The operating cost per million gallons and the cost per pound of BOD removed were \$56.93 and \$0.05 respectively.

The average daily flow was 1.06 mg. The design flow of 0.75 mgd was exceeded 93 percent of the time. Substantial increases in flow were received at the plant during storm periods indicating high infiltration. Such high flows can only be given primary treatment and chlorination prior to discharge.

The average raw sewage BOD and suspended solids concentrations were 122 mg/l and 124 mg/l respectively. The average effluent BOD and suspended solids concentrations were 13 mg/l and 11 mg/l respectively. On the average, the BOD and suspended solids reductions were 89 percent and 91 percent respectively.

PROJECT COSTS

NET CAPITAL COST (Final)	
Long Term Debt to OWRC	\$ <u>382,773.39</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1968	\$ <u>151,850.11</u>
Net Operating	\$ 22,110.92
Debt Retirement	13,887.00
Reserve	1,660.44
Interest Charged	<u>21,490.21</u>
TOTAL	\$ <u>59,148.57</u>

RESERVE ACCOUNT

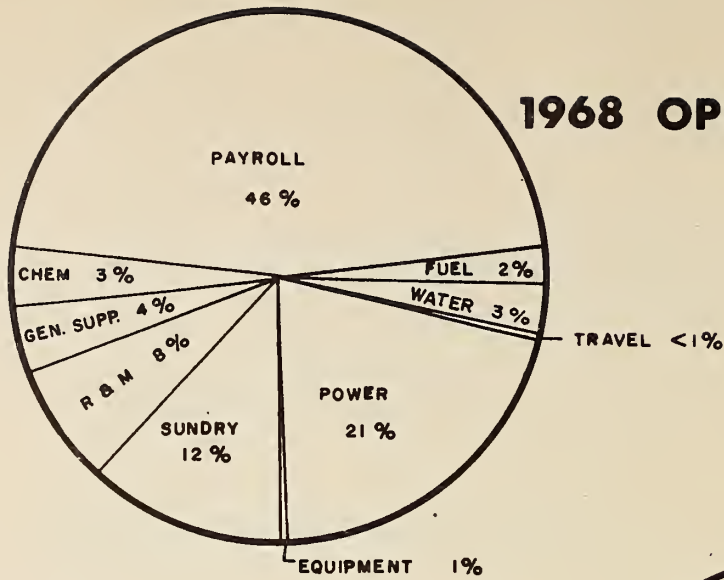
Balance at January 1, 1968	\$ 16,514.68
Deposited by Municipality	1,660.44
Interest Earned	1,011.98
	<hr/>
	\$ 19,187.10
Less Expenditures	<u>1,135.89</u>
Balance at December 31, 1968	\$ <u>18,051.21</u>

Monthly Operating Costs

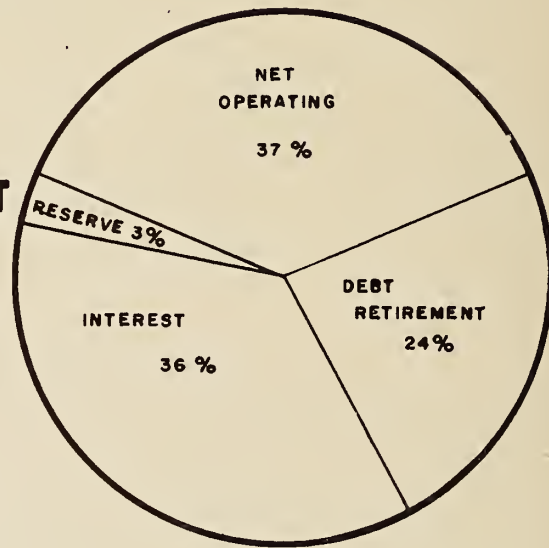
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY	WATER	TRAVEL
JAN	1123.85	660.60	-	-	370.18	-	21.83	-	-	22.20	49.04	-
FEB	2123.29	686.63	-	123.85	333.71	-	91.50	284.04	314.17	240.35	49.04	-
MAR	1783.47	1017.70	-	-	337.51	-	38.46	-	76.33	264.43	49.04	-
APRIL	1564.92	652.81	-	112.63	345.47	-	117.89	-	78.28	208.80	49.04	-
MAY	1789.79	650.70	69.07	-	321.35	-	115.00	-	314.84	269.79	49.04	-
JUNE	1826.15	649.42	259.03	-	385.94	284.73	66.51	(266.70)	97.28	300.90	49.04	-
JULY	1519.60	350.52	282.16	-	395.54	-	56.15	-	93.61	292.58	49.04	-
AUG	1735.42	661.05	383.49	-	-	238.61	58.10	-	38.07	356.10	-	-
SEPT	2112.10	610.29	310.82	-	741.72	-	22.83	-	22.97	282.50	98.08	22.89
OCT	1430.99	676.93	155.41	-	-	238.61	208.79	12.00	123.55	15.70	-	-
NOV	2405.36	635.92	79.38	149.73	933.07	-	56.07	(12.00)	-	465.11	98.08	-
DEC	2695.98	1246.94	241.51	-	490.38	-	98.76	-	513.59	18.94	49.04	36.82
TOTAL	22110.92	8499.51	1780.87	386.21	4654.87	761.95	951.89	17.34	1672.69	2737.40	588.48	59.71

* SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE \$3,136.75
BRACKETS INDICATE CREDIT

1968 OPERATING COSTS



TOTAL ANNUAL COST



Yearly Operating Costs

YEAR	M.G.TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER LB OF BOD REMOVED
1964	235.49	\$21,958.00	\$93.24	6 cents
1965	299.87	21,966.58	73.25	6 cents
1966	297.76	23,894.31	80.25	7 cents
1967	383.66	24,427.22	63.67	7 cents
1968	388.37	22,110.92	56.93	5 cents

Process Data

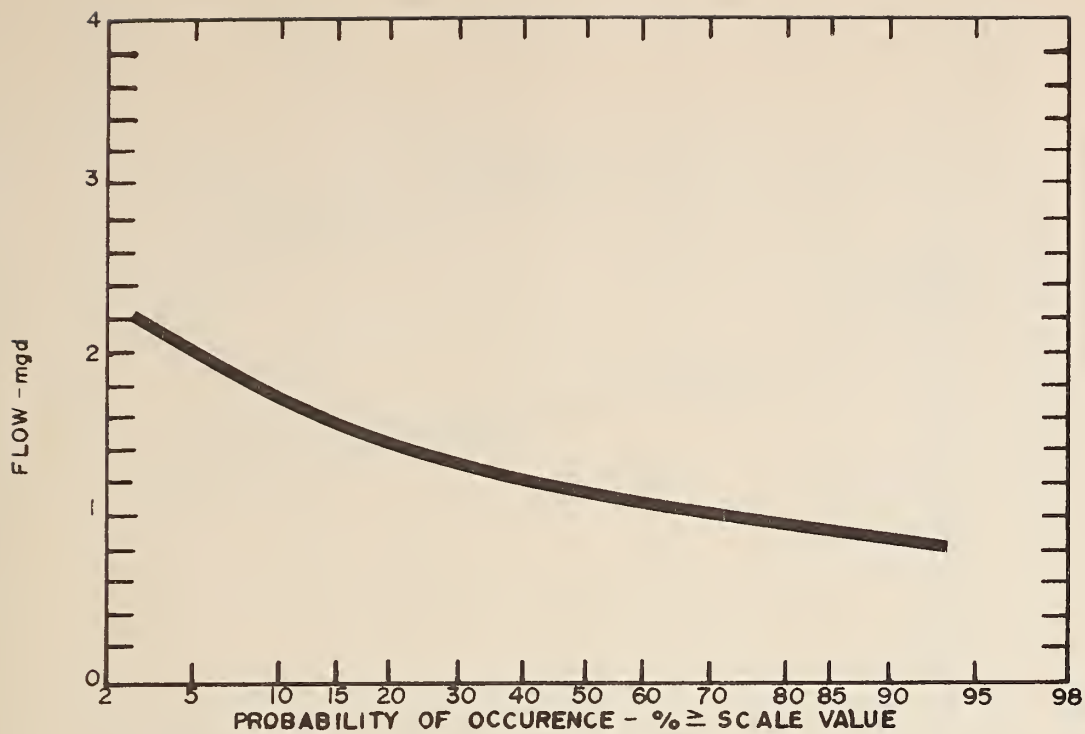
A total of 388.37 mg was treated at the Elizabeth Gardens plant. This represents an increase of one percent over the 1967 total flow. The average daily flow for the year was 1.06 mg. The maximum flow for one month occurred in September with a total flow of 39.98 mg. The maximum flow for one day occurred in March with a total flow of 2.50 mg.

An average chlorine dosage of 1.9 mg/l was required to maintain a 0.5 mg/l chlorine residual after 15 minutes' contact time. Chlorination was not carried out during the winter months.

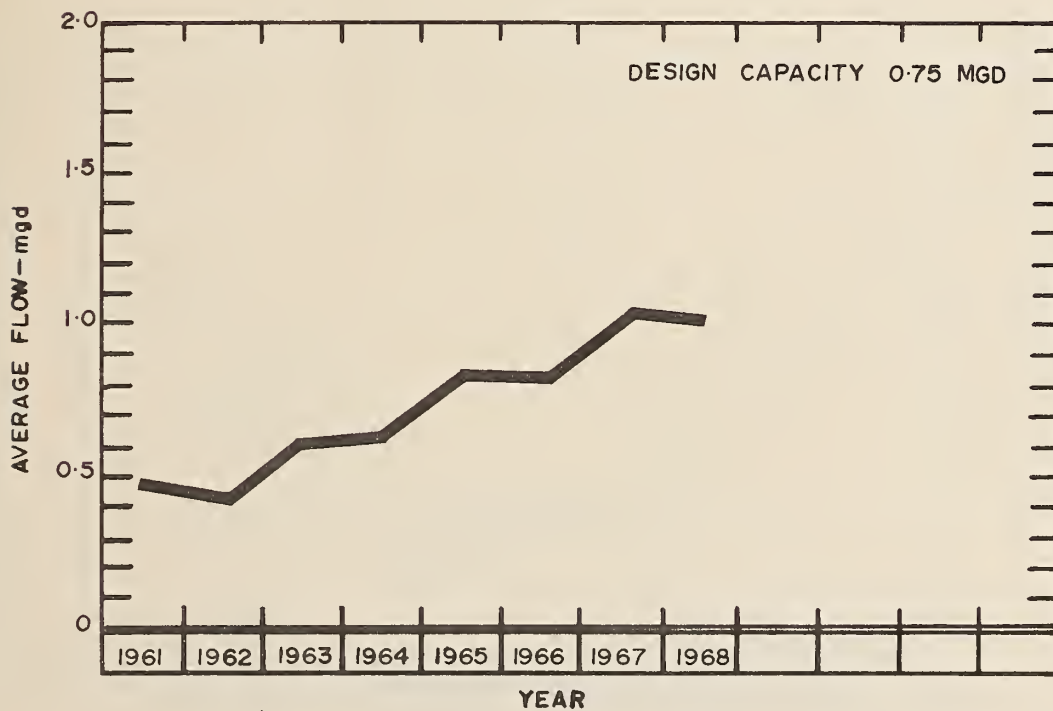
PLANT FLOWS and CHLORINATION

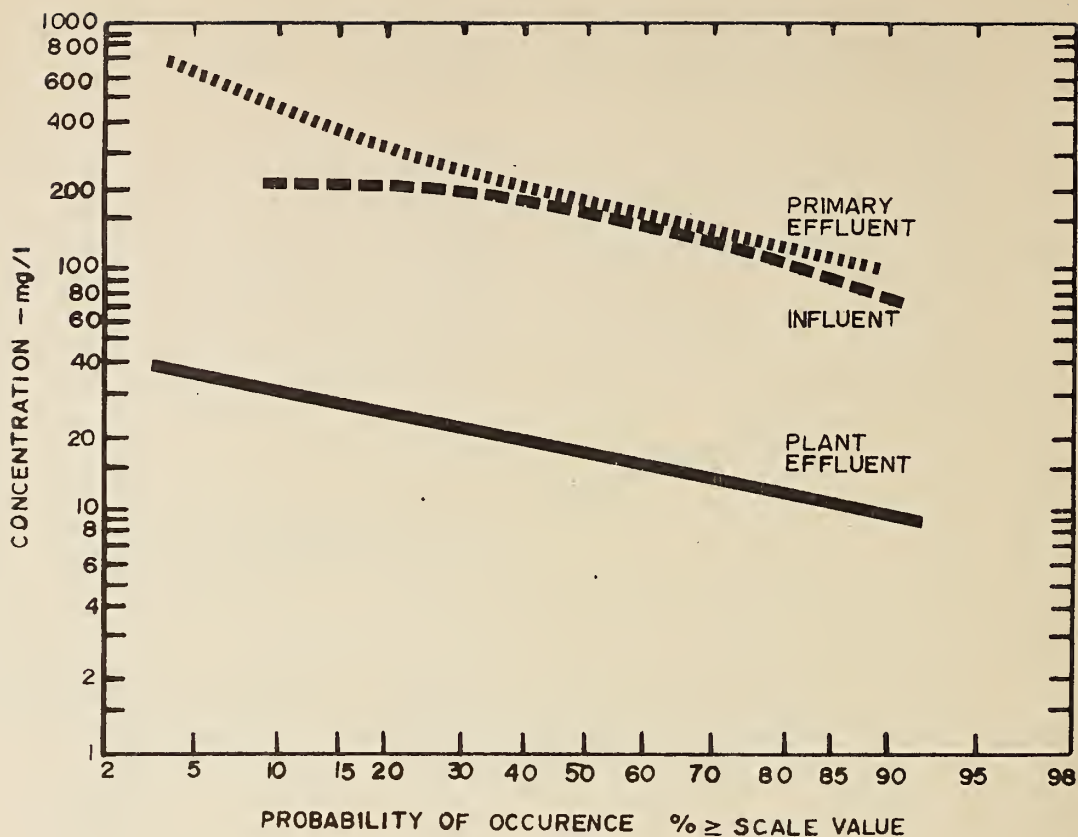
MONTH	TOTAL FLOW mg	AVERAGE DAILY FLOW mg	MAXIMUM DAILY FLOW mg	MINIMUM DAILY FLOW mg	CHLORINE USED lbs.	DOSAGE mg/l
JAN	28.45	.91	1.47	.66	0	0
FEB	30.74	1.06	2.30	.67	0	0
MAR	30.51	.98	2.50	.62	0	0
APR	30.24	1.01	1.42	.77	0	0
MAY	39.84	.96	1.52	.70	410	2.7
JUN	31.11	1.04	1.88	.84	671	2.2
JUL	25.88	.83	1.11	.70	768	3.0
AUG	34.05	1.10	2.25	.67	720	2.1
SEPT	39.98	1.33	2.18	.88	718	1.8
OCT	30.45	.98	1.68	.68	387	2.6
NOV	38.88	1.30	2.37	.68	0	0
DEC	38.24	1.23	1.99	.82	0	0
TOTAL	388.37	-	-	-	3674	-
AVERAGE	-	1.06	-	-	612*	1.9*

* 6 month's chlorination

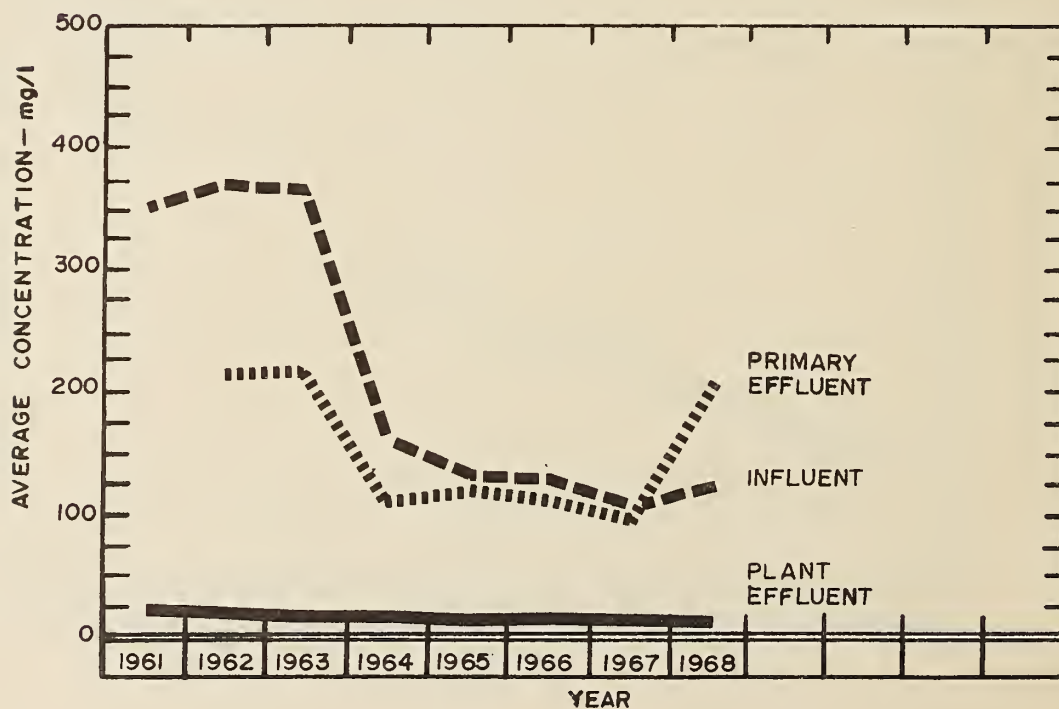


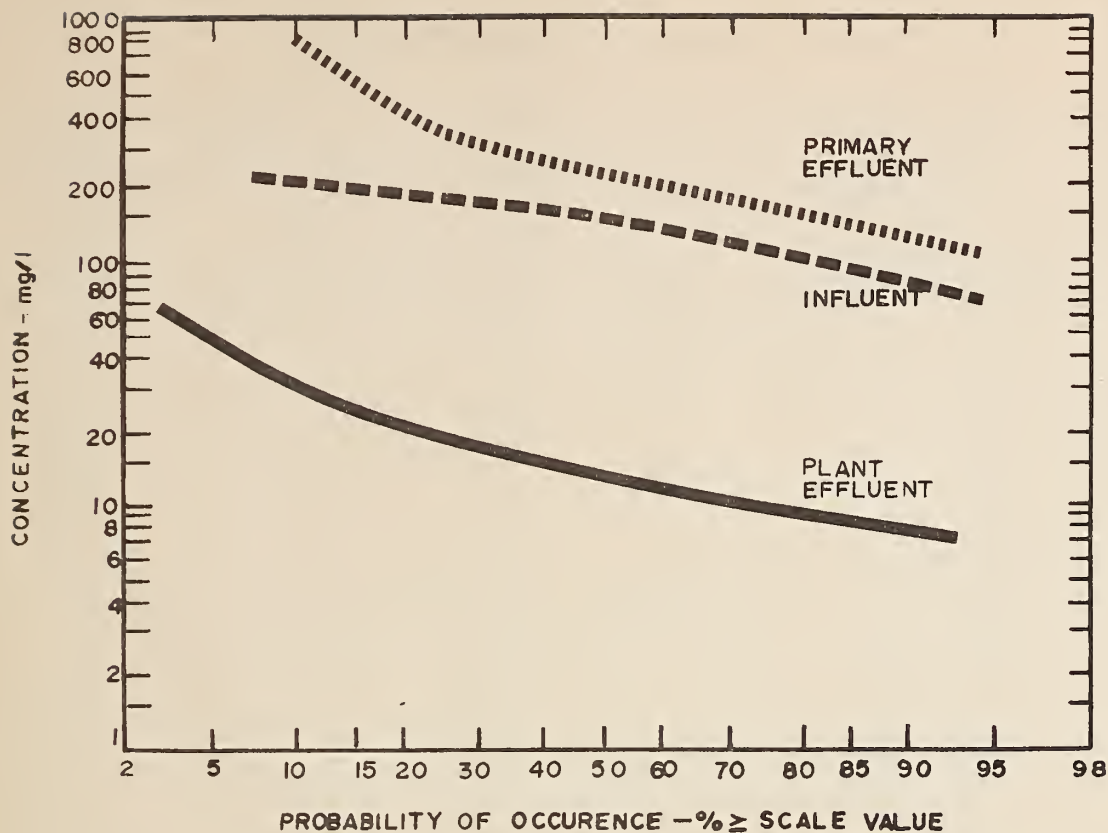
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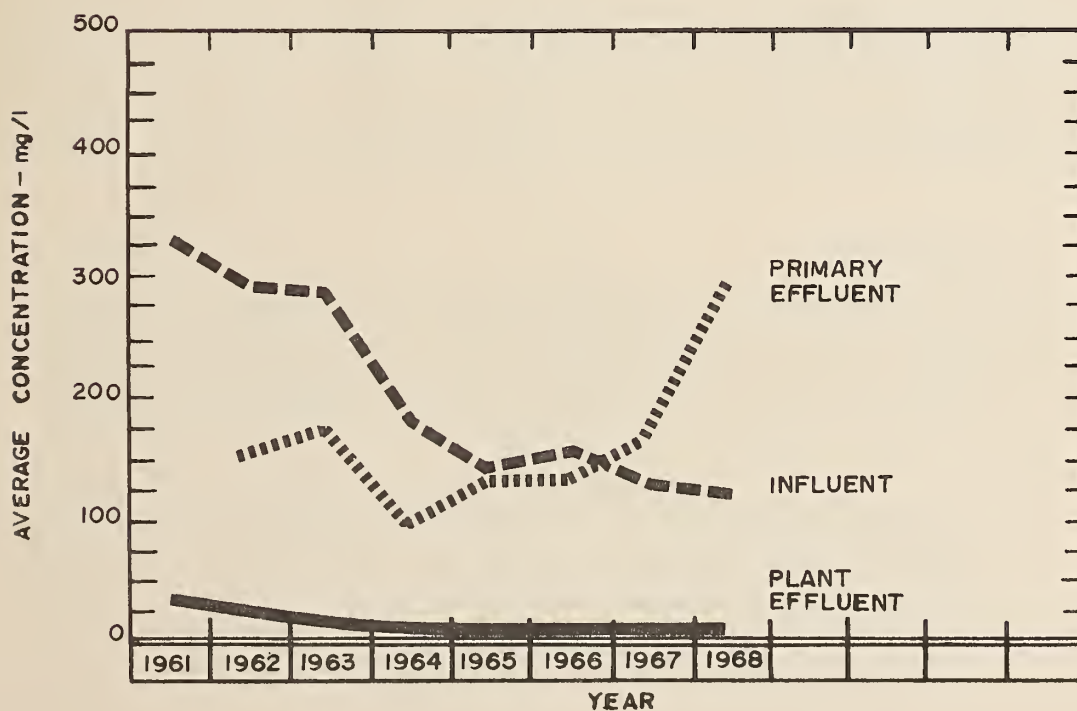


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				GRIT
	INF CONC ^N mg/l	EFF CONC ^N mg/l	RED ^N %	REMOVAL 10 ³ lb	INF CONC ^N mg/l	EFF CONC ^N mg/l	RED ^N %	REMOVAL 10 ³ lb	REMOVAL ft ³
JAN	73	14	80	16.7	121	9	93	31.9	20
FEB	125	17	86	33.2	108	10	91	30.1	14
MAR	120	7	94	34.5	106	8	92	29.9	90
APR	93	8	91	25.6	92	11	88	24.5	80
MAY	147	10	93	40.9	166	14	92	45.3	30
JUN	150	9	94	43.8	134	9	93	38.9	-
JULY	147	29	80	30.5	138	11	92	32.9	85
AUG	136	25	82	37.8	99	14	86	28.9	100
SEPT	107	10	91	38.8	125	10	92	46.0	47
OCT	163	9	95	46.9	157	6	96	46.0	28
NOV	100	6	94	36.6	122	7	94	44.7	41
DEC	98	11	89	33.3	114	21	82	35.6	49
TOTAL	-	-	-	418.6	-	-	-	434.7	584
AVERAGE	122	13	89	34.9	124	11	91	36.2	49

COMMENTS

The average raw sewage BOD and suspended solids concentrations during the year were 122 mg/l and 124 mg/l respectively. The average effluent BOD and suspended solids concentrations for 1968 were 13 mg/l and 11 mg/l respectively. The average percent reductions of BOD and suspended solids were 89 and 91 respectively.

During periods of high flows, the primary effluent concentrations of BOD and suspended solids frequently exceeded those of the raw sewage. This is attributed to high flows and to supernatant return from the single digester.

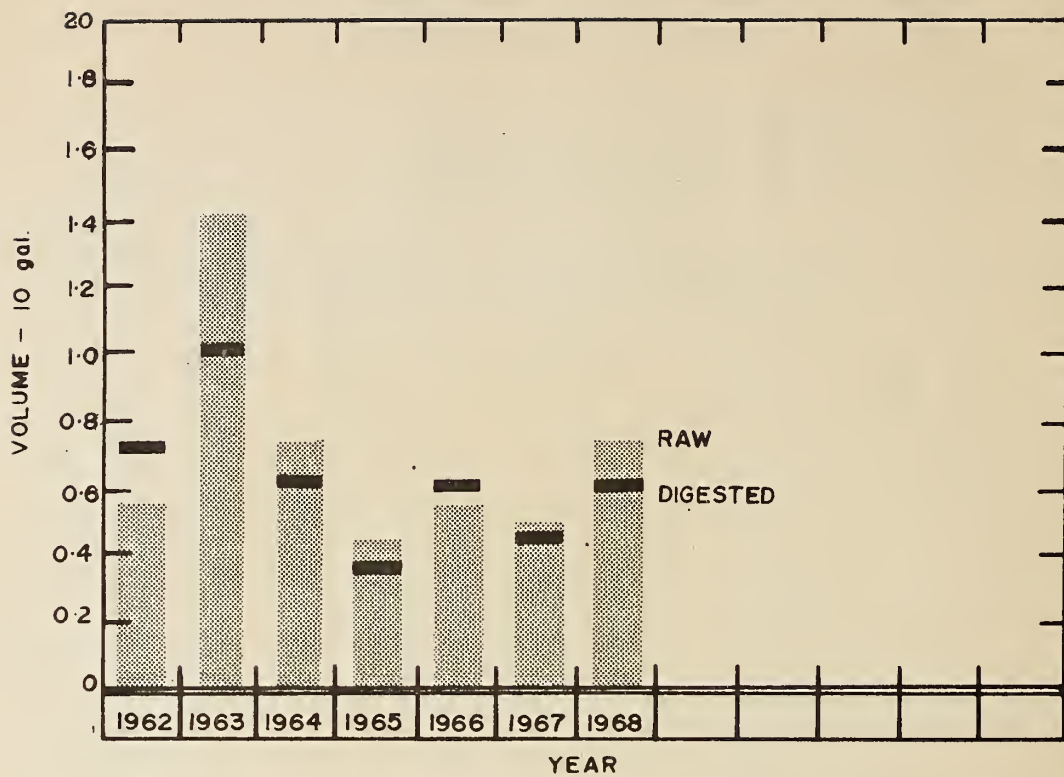
During 1968 a total of 584 cu. ft. of grit was removed.

AERATION

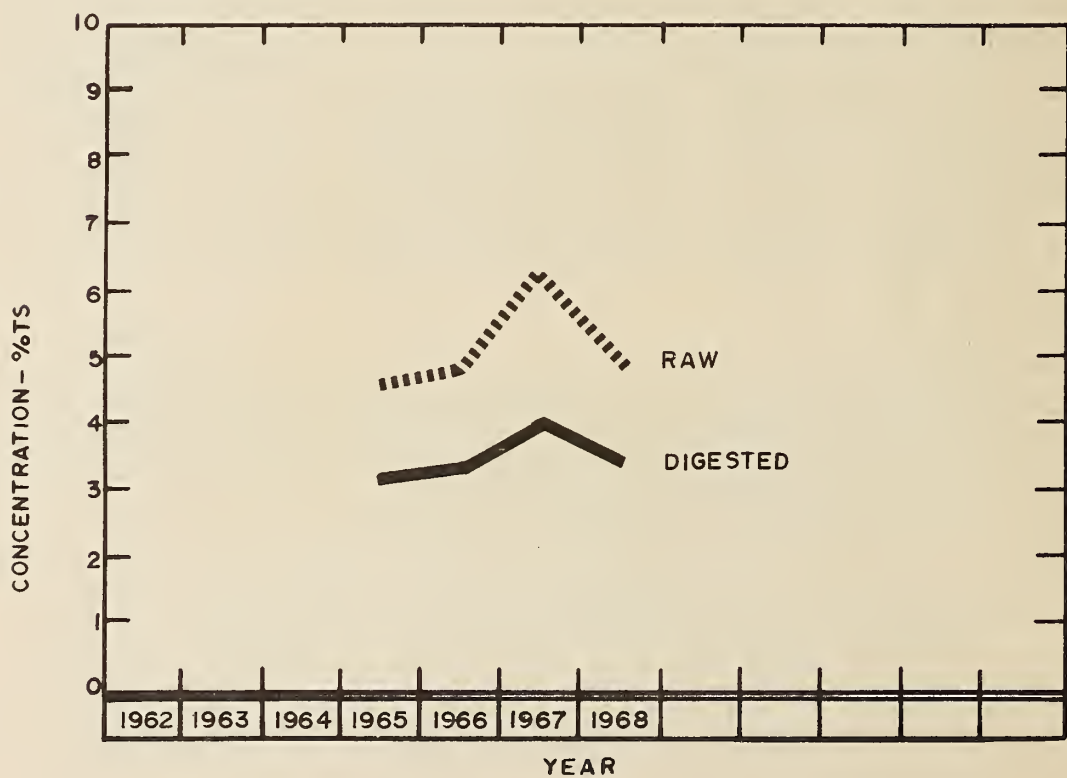
MONTH	AVERAGE FLOW mgd	PRIMARY EFF		SECONDARY EFF		MLSS CONC ^N mg/l	F/M $\left(\frac{\text{lb BOD}}{\text{lb MLSS}}\right)$	AIR USED $\left(\frac{1000 \text{ ft}^3}{\text{lb BOD}}\right)$ REMOVED	WASTE SLUDGE 10^5 lb
		BOD CONC ^N mg/l	SS CONC ^N mg/l	BOD CONC ^N mg/l	SS CONC ^N mg/l				
JAN	.92	181	304	14	9	1,840	.32	.70	-
FEB	1.06	143	102	17	10	1,590	.35	.81	-
MAR	.98	107	119	7	8	1,730	.22	1.10	-
APRIL	1.01	122	161	8	11	1,670	.27	.94	-
MAY	.96	175	212	10	14	2,100	.29	1.03	-
JUN	1.04	235	256	9	9	2,180	.41	.90	-
JUL	.83	127	124	29	11	2,060	.18	2.55	-
AUG	1.10	101	130	25	14	2,100	.19	2.59	-
SEPT	1.33	168	221	10	10	2,850	.28	1.03	-
OCT	.98	575	960	9	6	3,030	.67	.39	1.48
NOV	1.30	352	660	6	7	2,310	.72	.38	.80
DEC	1.23	193	296	11	21	2,520	.34	.96	.08
TOTAL	-	-	-	-	-	-	-	-	-
AVERAGE	1.06	207	294	13	11	2,170	.35	1.12	.79

COMMENTS

The average loading in pounds of BOD per pound of mixed liquor suspended solids was 0.35. The average cubic feet of air per pound of BOD removed was 1,120, while the average mixed liquor suspended solids concentration was 2170 mg/l.



DIGESTION



SLUDGE DIGESTION and DISPOSAL

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME 10 ³ gal	T. S. %	V. S. %	VOLUME 10 ³ gal	T. S. %	V. S. %	VOLUME 10 ³ gal	T. S. %	LIQUID yd ³	DEWATERED yd ³
JAN	92.3	4.8	72	69.8	4.2	55	-	-	413	-
FEB	50.9	4.8	76	34.9	3.5	59	-	-	207	-
MAR	36.2	4.6	76	44.0	3.8	62	-	-	261	-
APR	49.4	5.0	71	34.9	3.1	58	-	-	207	-
MAY	49.4	5.9	74	58.1	4.1	64	-	-	345	-
JUN	54.0	5.0	73	31.0	4.2	54	-	-	184	-
JUL	67.2	4.9	72	26.4	3.9	55	-	-	449	-
AUG	39.7	6.3	67	53.8	4.9	62	-	-	319	-
SEPT	80.7	3.5	69	42.9	2.4	58	-	-	254	-
OCT	100.2	4.5	73	67.6	2.7	61	-	-	398	-
NOV	68.8	3.5	67	84.2	2.8	50	-	-	510	-
DEC	67.6	4.7	77	54.2	2.8	66	-	-	322	-
TOTAL	756.4	-	-	601.8	-	-	-	-	3869	-
AVERAGE	63.0	4.8	72	50.2	3.5	59	-	-	323	-

COMMENTS

On the average the volatile solids were reduced by 40 percent, while the total solids were reduced by 27 percent.

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CONCLUSIONS

The high flows received during storm periods necessitated a reduction in treatment to a portion of such flows.

The average BOD and suspended solids removals were 89 percent and 91 percent respectively during periods when the flow was not bypassing the aeration section. The average daily flow was 1.06 mg, 42 percent greater than design flow.

RECOMMENDATIONS

The present program of eliminating storm water from the system should be continued. Serious consideration should be given to the possibility of redirecting a portion of the Elizabeth Gardens flow to the Burlington Skyway Water Pollution Control Plant.



Water management in Ontario